SUPPORT FOR THE AMENDMENT

This Amendment cancels Claims 2-4; and amends Claim 1. Support for the amendments is found in the specification and claims as originally filed. In particular, support for Claim 1 is found in canceled Claims 2-4. No new matter would be introduced by entry of these amendments.

Upon entry of these amendments, Claims 1 and 5-6 will be pending in this application. Claim 1 is independent.

REQUEST FOR RECONSIDERATION

Applicants respectfully request entry of the foregoing and reexamination and reconsideration of the application, as amended, in light of the remarks that follow.

The present invention provides a method for producing a laminate of a metal sheet and a thermoplastic polymer, which is capable of forming an optically anisotropic melt phase. By heat-treating a film of the thermoplastic polymer on a heat treatment roll having unevenness without transferring the unevenness to the polymer film, residual strain in the polymer film can be eliminated. As a result, when the polymer film is subsequently thermally press-bonded to the metal sheet to form the laminate, the polymer film does not shrink or expand, and a polymer film/metal sheet laminate with superior dimensional stability and flatness can be obtained.

Claims 1-6 are rejected under 35 U.S.C. § 103(a) over U.S. Patent No. 5,360,672 ("Saito") in view of either one of U.S. Patent No. 5,028,457 ("Kinose") or U.S. Patent No. 3,947,296 ("Kumazawa"). In addition, Claim 3 is rejected under 35 U.S.C. § 103(a) over Saito and either one of Kinose or Kumazawa, and further in view of the admitted prior art in the specification at pages 1-3 ("APA"). Claims 1-6 are also rejected under 35 U.S.C.

§ 103(a) over APA in view of U.S. Patent No. 4,798,875 ("Itoyama") and either one of Kinose or Kumazawa.

Saito discloses a process for treating a film comprising a liquid crystal polymer that includes passing the film between press rolls at elevated temperature and a linear pressure of 20 to 400 kg/cm. Saito at abstract. Saito discloses that "optional adhesives" may be used for adhering a metal foil to the polymer film. Saito at column 8, lines 18-20. However, Saito is silent about thermal press-bonding the polymer film to the metal foil.

Kinose and Kumazawa are cited by the Final Rejection in support of the proposition that all heat treatment rolls have some degree of surface roughness. Final Rejection at page 3, lines 10-12; page 6, lines 14-16. Kinose discloses that a smooth roll can have a roughness as large as just below 15 μm. Kinose at column 6, lines 58-59. Kumazawa discloses that the roughness limit for an ordinary smooth roll is several microns. Kumazawa at column 2, lines 57-59.

APA discloses the conventional process of EP 0507332 A2 in which thermal press-bonding between press rolls is used to form a laminate of a liquid crystal polymer film and a metal foil.

Itoyama discloses a polyester film that is drawn and then heat-treated "on an oven or roll according to known procedures". Itoyama at abstract; column 14, lines 29-32.

However, the cited prior art fails to suggest the independent Claim 1 limitation that "the film is heat-treated on the heat treatment roll having the unevenness on the surface thereof under substantially no pressure". Thus, the cited prior art fails to have rendered the claimed invention *prima facie* obvious.

Any *prima facie* case of obviousness based on the cited prior art is rebutted by the significant reduction in the thermal dimensional change at 200°C of heat-treated polymer film, where the polymer is capable of forming an optically anisotropic melt phase, that is

achieved according to the present invention by heat-treating the polymer film on a heat treatment roll having unevenness without transferring the unevenness to the film. See the comparative examples in the specification at page 27, Table 6, reproduced below:

[Table 6]

	Thermal dimensional change of film after heat treatment (%)	Bond strength (Kg/cm)	Dimensional stability of laminate (%)		Appearance
			MD	TD	
Example 1	0.05	1.2±0.1	-0.01	+0.01	O
Example 2	0.07	1.3±0.1	+0.05	-0.02	O
Example 3	0.04	1.5±0.1	-0.02	+0.01	Δ
Example 4	0.10	1.2±0.1	0	+0.01	O
Example 5	-0.05	1.2±0.1	-0.03	-0.05	Δ
Example 6	0.35	1.2±0.1	+0.05	+0.07	Δ
Comparative Example 1	1.2	1.2±0.5	+0.10	-0.05	×
Comparative Example 2	-2.0	0.7±0.7	+0.25	-0.20	×

Table 6 shows that Examples 1-5 of the present invention, which were produced by heat treating the polymer film on a heat treatment roll having unevenness of 2 μm (Example 3) or 15 μm (Examples 1-2 and 4-5), at a temperature of 180°C (Example 4), 200°C ((Examples 1-3) or 220°C (Example 5), without transferring the unevenness to the polymer film, exhibited thermal dimensional changes upon subsequent heating to 200°C of **not more than 0.10%**. In Example 6 the heat treatment roll had an unevenness of 15 μm and was at a temperature of 140°C, and the thermal dimensional change upon subsequent heating to 200°C was 0.35%. See discussion of Table 6 in the specification at pages 19-28.

In contrast, Table 6 shows that Comparative Examples 1 and 2, which were heat-treated on a heat treatment roll without surface unevenness, at a temperature of 200°C, exhibited thermal dimensional changes upon subsequent heating to 200°C of **1.2%** and **-2.0%**, respectively, over ten times larger than Examples 1-5.

The Final Rejection admits that <u>Saito</u>, <u>Itoyama</u> and <u>APA</u> are all "silent as to the thermal dimensional change at 200°C of the LCP film", i.e., silent about the Claim 1 limitation that "a thermal dimensional change of said heat-treated film is not more than 0.1% at 200°C". Final Rejection at page 3, lines 21-22; page 7, lines 3-5.

Table 6 shows that the independent Claim 1 limitation that "a thermal dimensional change of said heat-treated film is not more than 0.1% at 200°C" is not inherent when a thermoplastic polymer film, which is capable of forming an optically anisotropic melt phase, is heat-treated on a heat treatment roll.

There is no recognition in the cited prior art that the independent Claim 1 features of "**heat-treating** a film comprising a thermoplastic polymer, which is capable of forming an optically anisotropic melt phase, **on a heat treatment roll having *unevenness*** on a surface thereof ***without*** **transferring the *unevenness*** to the film" play any role is achieving a heat-treated film, which is stable under subsequent heat treatment such that "a **thermal**

dimensional change of said heat-treated film is **not more than 0.1% at 200°C**". The thermal stability of the polymer film after the heat treatment on the uneven surface enables polymer film/metal sheet laminates produced by subsequent thermal press-bonding to have improved dimensional stability and flatness.

Because the cited prior art fails to suggest the significant reduction in the thermal dimensional change at 200°C of heat-treated polymer film that is achieved according to the present invention by heat-treating the polymer film on a heat treatment roll having unevenness without transferring the unevenness to the film, any *prima facie* case of obviousness based on the cited prior art is rebutted.

Because the cited prior art fails to suggest all the limitations of independent Claim 1, and any *prima facie* case of obviousness based on the cited prior art is rebutted, the rejections under 35 U.S.C. 103(a) should be withdrawn.

In view of the foregoing amendments and remarks, Applicants respectfully submit that the application is in condition for allowance. Applicants respectfully request favorable consideration and prompt allowance of the application.

Should the Examiner believe that anything further is necessary in order to place the application in even better condition for allowance, the Examiner is invited to contact Applicants' undersigned attorney at the telephone number listed below.

Respectfully submitted,

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